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LAW OFFICE OF GLENN R. SMITH
28626 BROOKHILL ROAD
TRABUCO CANYON, CA 92679-1163

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CAMPOS, YAIMA	

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/655,948
Filing Date: September 05, 2003
Appellant(s): NOURMOHAMADIAN ET AL.

John A. Castellano
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed January 16, 2008 appealing from the Office action mailed January 31, 2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,455,926	Keele et al.	10-1995
Dailey et al.	US 2004/0098244	5-2004

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 16-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Keele et al. (US 5,455,926).

<u>**Claim 16**</u>, Keele discloses a virtual tape stacker comprising: **["an optical disk system and method for emulating a set of magnetic tape drives using virtual tape data stored on optical disks" (Col. 17, lines 60-64)]**

a server interface adapted to communicate with a server; " **[Item 12; IBM Mainframe Computer (Figure 1) "MOST 10 provides a transparent interface between IBM System 370 compatible mainframes 12 and optical disks 10" (Column 22, lines 41-44)]**

a random access data storage device; **[set of "optical disk drives 16a-16b" (Figure 1 and related text; Col. 18, lines 18-20)]**

a data path adapted to communicate with the random access data storage device; and **[Data path shown from port 17 Optical disk drive 16a (Figure 1)]**

a controller configured to transfer data between the server interface and the random access data storage device via the data path; **[MOST Controller 14 (Figure 1)]**

wherein the controller manages the data on the random access data storage device as a plurality of virtual tape volumes, **["MOST records a collection of virtual tapes on optical disks. The emulation process stores "virtual tapes" on the optical disks" (Col. 20, lines 32-41)]**

wherein the controller defines a virtual tape drive for transferring data between the server and the virtual tape volumes, **["each disk cartridge can be visually identified by a disk number and serial number directed on the optical disk of all the virtual tapes recorded on the optical disk" (Col. 20, lines 32-41)]**

wherein the controller defines a sequential order for loading the virtual tape volumes into the virtual tape drive, and **[Keele discloses this limitation as "MOST records a collection of virtual tapes on optical disks. The emulation process stores "virtual tapes" on the optical**

disks" (Col. 20, lines 32-41) wherein "each optical disk contains one or more virtual tapes" (Col. 40, lines 5-6) and explains "the optical disk 20 is made up of one-thousand-and-twenty-four byte sectors. These sectors can be written and read sequentially from the start of the optical disk through to the end" (Col. 40, lines 64-67); therefore, writing/storing virtual tapes in sequential order within optical drives. Furthermore, refer to Figure 5 where Keele illustrates "Tape directory" having virtual tapes stored in sequential order as "virtual tape # 1 (324a), virtual tape #2 (324b)… virtual tape #N (324c)." Keele also discloses (Tape Directory Format Table) which illustrates a "first sector information" having a "first VT" stored within bytes 16-31, and a "second VT" stored within bytes 32-47; therefore, storing virtual tapes in a sequentially within optical disks]

wherein, in response to an eject command from the server, the controller unloads one of the virtual tape volumes from the virtual tape drive and loads a next consecutive one of the virtual tape volumes into the virtual tape drive according to the sequential order **[With respect to this limitation, Keele discloses "MOST reduces operator labor due to the automatic mounting and dismounting of virtual tapes" (Col. 20, lines 12-13) wherein "one key press will ready a drive, or rewind or unload a virtual tape" (Col. 36, lines 55-58) and explains "one a virtual tape is mounted from those available on a given disk 20, no other virtual tapes on that disk may be accessed by the mainframe until the first virtual tape is dismounted" (Col. 40, lines 5-11). Keele also discloses virtual tapes/data are written/read to optical disks sequentially (Col. 20, lines 32-41 and Col. 40, lines 64-67); therefore, being able to read/mount a next virtual tape or any virtual tape stored within optical disks. Keele specifies "the tape directory 318 comprises an ID Byte 322, tape data 324a, 324b through 324c for each virtual**

tape, and a continuation byte pointer 326" (Col. 43, lines 42-44) and is used to identify virtual tapes on a disk (Col. 43, lines 58-60) (Also see Col. 44, lines 5-67)].

As per **claim 17**, Keele discloses the virtual tape stacker according to claim 16 further comprising:

a volume management table residing on the random access data storage device and accessible by the controller, the volume management table having pointers to the virtual tape volumes; **[Keele discloses that "the controller 14 stores tape maps of the virtual tapes mounted in each optical drive" and further explains that a tape map "pointer points to a respective tape map 348 of each virtual tape"(Column 44, lines 5-6; Col. 20, line 67-Col. 21, line 6)]**

and a virtual tape manager residing on the controller that accesses the pointers so as to determine the next consecutive one of the virtual tape volumes **[With respect to this limitation, Keele teaches a tape directory which "points to a tape map for each virtual tape" (Column 40, line 38), that the MOST controller uses the system of pointers to "seek addresses on the optical disk" (Column 40, lines 45-46). Keele also discloses the "recording of updated tape directories for virtual tapes that were added, deleted or altered" (Column 20, lines 61-66) and further explains that "the tape map, stored for each virtual tape on the optical disk, is used to keep track of where on the disks 20 each record is stored." (Column 41, lines 22-25) (Figure 1). Keele also discloses virtual tapes/data are written/read to optical disks sequentially (Col. 20, lines 32-41 and Col. 40, lines 64-67); therefore, being able to reading/mount a next virtual tape. Therefore, MOST controller is able to access tape**

directory having pointers to tapes maps to determine the next consecutive virtual tape volume or the location of any tape volume within optical disks].

As per **claim 18**, Keele discloses the virtual tape stacker according to claim 17 further comprising:

a physical tape device; **["MOST can be used alone or in conjunction with 3420 or 3480 tape subsystems" (Col. 19, lines 2-15) which comprise cartridge tape drives which correspond to physical tape devices]**

and a tape cartridge loadable into the physical tape device, **["MOST can be used alone or in conjunction with 3420 or 3480 tape subsystems" (Col. 19, lines 2-15) which comprise cartridge tape drives having loadable tapes (Col. 18, lines 12-26)]**

wherein a physical tape volume corresponding to the tape cartridge is integrated into the virtual tape volume storage rotation **[With respect to this limitation, Keele discloses "MOST can be used alone or in conjunction with 3420 or 3480 tape subsystems" (Col. 19, lines 2-15) which comprise tape cartridge tape drives having loadable tapes and explains "the moving existing data from magnetic tape to optical disks… conversion to the optical media requires that data be transferred from magnetic tape. This can be accomplished by copying existing data from tape to optical storage" (Col. 19, lines 2-29) wherein "each optical disk contains one or more virtual tapes" (Col. 40, lines 5-6) and explains "the optical disk 20 is made up of one-thousand-and-twenty-four byte sectors. These sectors can be written and read sequentially from the start of the optical disk through to the end" (Col. 40, lines 64-67)]**.

As per **claim 19,** Keele discloses a virtual tape stacker method comprising: providing a plurality of virtual tape volumes on a random access storage device; **["an optical disk system and method for emulating a set of magnetic tape drives using virtual tape data stored on optical disks" (Col. 17, lines 60-64; Col. 18, lines 18-20)]**

defining a virtual tape drive in a volume management table located on the random access storage device; identifying the virtual tape volumes in a plurality of data management tables located on the random access storage device; storing in the volume management table a plurality of pointers to the data management tables so as to identify the location of the virtual tape volumes; and **["each virtual tape that was recorded on a disk has associated with it a respective tape map. The tape directory listing the virtual tapes has pointers to the respective tape maps. The tape maps keep track of the physical structure of the virtual tapes"(Col. 20, line 67- Col. 21, line 6)]**

predetermining an access order for the pointers so as to define a sequential order for loading the virtual tape volumes into the virtual tape drive in response to eject commands from a server **[With respect to this limitation, Keele discloses "the optical disk 20 is made up of one-thousand-and-twenty-four byte sectors. These sectors can be written and read sequentially from the start of the optical disk through to the end" (Col. 40, lines 64-67); therefore, writing/storing virtual tapes in sequential order within optical drives. Furthermore, refer to Figure 5 where Keele illustrates "Tape directory" having virtual tapes stored in sequential order as "virtual tape # 1 (324a), virtual tape #2 (324b)… virtual tape #N (324c)." Keele also discloses (Tape Directory Format Table) which illustrates a "first sector information" having a "first VT" stored within bytes 16-31, and a "second VT" stored**

within bytes 32-47; therefore, storing virtual tapes in a sequentially within optical disks. Keele discloses "MOST reduces operator labor due to the automatic mounting and dismounting of virtual tapes" (Col. 20, lines 12-13) wherein "one key press will ready a drive, or rewind or unload a virtual tape" (Col. 36, lines 55-58) and explains "one a virtual tape is mounted from those available on a given disk 20, no other virtual tapes on that disk may be accessed by the mainframe until the first virtual tape is dismounted" (Col. 40, lines 5-11). Because Keele is able to mount/dismount any virtual tape written on optical disks defined within Tape Directory, and because Keele explains that optical disks can be written and read sequentially, Keele's invention is able to load/unload a virtual tape that is next in the sequential order in which tapes are written to optical disks. Keele further provides a greater advantage as Keele's invention is able to load any virtual tape written on optical disks by using random search. Refer to (Col. 29, lines 48-60; Col. 36, lines 18-60) wherein Keele teaches having a system of jukeboxes which store optical disks that contain virtual tapes on physical slots and explains that one drive (which contains a currently loaded virtual tape) is unloaded at the same time another drive is being loaded wherein optical disks are written sequentially but can be searched/read in sequential or random order].

As per **claim 20**, Keele discloses the virtual tape stacker method according to claim 20 further comprising:

reading one of the pointers according to the access order; **[[With respect to this limitation, Keele discloses that when a virtual tape is "mounted, the tape map is read and if it has been altered, is written onto the disk" and "the pointer to the tape map is recorded in**

the tape directory for each virtual tape" (Column 44, lines 48-52) as a way of accessing, reading and updating pointers every time a virtual volume is loaded on a disk]

locating one of the data management tables according to the read pointer; and **[With respect to this limitation, Keele teaches a tape directory which "points to a tape map for each virtual tape" (Column 40, line 38)]**

addressing a next consecutive one in the sequential order of the virtual tape volumes according to the located one of the data management tables **[Keele discloses that the MOST controller uses the system of pointers to "seek addresses on the optical disk" (Column 40, lines 45-46). Keele also discloses the "recording of updated tape directories for virtual tapes that were added, deleted or altered" (Column 20, lines 61-66) and further explains that "the tape map, stored for each virtual tape on the optical disk, is used to keep track of where on the disks 20 each record is stored." (Column 41, lines 22-25) (Figure 1). Keele also discloses virtual tapes/data are written/read to optical disks sequentially (Col. 20, lines 32-41 and Col. 40, lines 64-67); therefore, being able to read/mount a next virtual tape. Therefore, MOST controller is able to access tape directory having pointers to tapes maps to determine the next sequentially consecutive virtual tape volume or the location of any tape volume within optical disks by random allocation. Optical disks are written sequentially and can be read/accessed sequentially or randomly]**.

As per **claim 21**, Keele discloses the virtual tape stacker method according to claim 20 further comprising:

providing a physical tape volume loaded on a physical tape device; and **["MOST can be used alone or in conjunction with 3420 or 3480 tape subsystems" (Col. 19, lines 2-15) which comprise cartridge tape drives which correspond to physical tape devices]**

integrating the physical tape volume in a storage rotation of the virtual tape volumes **[With respect to this limitation, Keele discloses "MOST can be used alone or in conjunction with 3420 or 3480 tape subsystems" (Col. 19, lines 2-15) which comprise tape cartridge tape drives having loadable tapes and explains "the moving existing data from magnetic tape to optical disks… conversion to the optical media requires that data be transferred from magnetic tape. This can be accomplished by copying existing data from tape to optical storage" (Col. 19, lines 2-29) wherein "each optical disk contains one or more virtual tapes" (Col. 40, lines 5-6) and explains "the optical disk 20 is made up of one-thousand-and-twenty-four byte sectors. These sectors can be written and read sequentially from the start of the optical disk through to the end" (Col. 40, lines 64-67)].**

As per claim 22, Keele discloses a virtual tape stacker comprising:

a plurality of virtual tape volumes configured on a random access data storage device; **["an optical disk system and method for emulating a set of magnetic tape drives using virtual tape data stored on optical disks" (Col. 17, lines 60-64; Col. 18, lines 18-20)]**

a virtual tape drive defined by a controller in communications with the random access data storage device; **["MOST records a collection of virtual tapes on optical disks. The emulation process stores "virtual tapes" on the optical disks" (Col. 20, lines 32-41)]**

a virtual tape manager configured on the controller so as to transfer data between one of the virtual tape volumes loaded into the virtual tape drive and an application program, " [**"MOST has an advanced controller capable of data streaming" (Column 19, lines 57-58) "The emulation process stores virtual tapes on the optical disks" (Column 20, lines 33-34). Keele also discloses that "Mount Messages sent by the attached host computer 12 to MOST 10 are automatically interpreted and acted" (Figure 1, Column 36, lines 31-32). It is inherent that in order for a host computer to send messages, it must have an application program with one or more instructions readable and executable by a processor and also have a medium to transfer data**]

wherein the virtual tape manager indicates a sequential order for loading a next consecutive one of the virtual tape volumes into the virtual tape drive upon ejection of the loaded one of the virtual tape volumes [**With respect to this limitation, Keele discloses "the optical disk 20 is made up of one-thousand-and-twenty-four byte sectors. These sectors can be written and read sequentially from the start of the optical disk through to the end" (Col. 40, lines 64-67); therefore, writing/storing virtual tapes in sequential order within optical drives. Furthermore, refer to Figure 5 where Keele illustrates "Tape directory" having virtual tapes stored in sequential order as "virtual tape # 1 (324a), virtual tape #2 (324b)… virtual tape #N (324c)." Keele also discloses (Tape Directory Format Table) which illustrates a "first sector information" having a "first VT" stored within bytes 16-31, and a "second VT" stored within bytes 32-47; therefore, storing virtual tapes in a sequentially within optical disks. Keele discloses "MOST reduces operator labor due to the automatic mounting and dismounting of virtual tapes" (Col. 20, lines 12-13) wherein "one key press**

will ready a drive, or rewind or unload a virtual tape" (Col. 36, lines 55-58) and explains "one a virtual tape is mounted from those available on a given disk 20, no other virtual tapes on that disk may be accessed by the mainframe until the first virtual tape is dismounted" (Col. 40, lines 5-11). Because Keele is able to mount/dismount any virtual tape written on optical disks defined within Tape Directory, and because Keele explains that optical disks can be written and read sequentially, Keele's invention is able to load/unload a virtual tape that is next in the sequential order in which tapes are written to optical disks. Keele further provides a greater advantage as Keele's invention is able to load any virtual tape written on optical disks by using random search. Refer to (Col. 29, lines 48-60; Col. 36, lines 18-60) wherein Keele teaches having a system of jukeboxes which store optical disks that contain virtual tapes on physical slots and explains that one drive (which contains a currently loaded virtual tape) is unloaded at the same time another drive is being loaded wherein optical disks are written sequentially but can be searched/read in sequential or random order].

As per **claim 23**, Keele discloses the virtual tape stacker according to claim 22 further comprising:

a volume management table maintained in the virtual tape manager, **[Keele discloses that "the controller 14 stores tape maps of the virtual tapes mounted in each optical drive" and further explains that a tape map "pointer points to a respective tape map 348 of each virtual tape"(Column 44, lines 5-6; Col. 20, line 67-Col. 21, line 6)]**

a plurality of pointers to the virtual tape volumes stored in the volume management table, **["each virtual tape that was recorded on a disk has associated with it a respective tape map. The tape directory listing the virtual tapes has pointers to the respective tape maps. The tape maps keep track of the physical structure of the virtual tapes"(Col. 20, line 67-Col. 21, line 6)]**

wherein the sequential order of loading the virtual tape volumes into the virtual tape drive is determined by an access order of the pointers **[With respect to this limitation, Keele discloses "the optical disk 20 is made up of one-thousand-and-twenty-four byte sectors. These sectors can be written and read sequentially from the start of the optical disk through to the end" (Col. 40, lines 64-67); therefore, writing/storing virtual tapes in sequential order within optical drives. Furthermore, refer to Figure 5 where Keele illustrates "Tape directory" having virtual tapes stored in sequential order as "virtual tape # 1 (324a), virtual tape #2 (324b)… virtual tape #N (324c)." Keele also discloses (Tape Directory Format Table) which illustrates a "first sector information" having a "first VT" stored within bytes 16-31, and a "second VT" stored within bytes 32-47; therefore, storing virtual tapes in a sequentially within optical disks. Keele discloses "MOST reduces operator labor due to the automatic mounting and dismounting of virtual tapes" (Col. 20, lines 12-13) wherein "one key press will ready a drive, or rewind or unload a virtual tape" (Col. 36, lines 55-58) and explains "one a virtual tape is mounted from those available on a given disk 20, no other virtual tapes on that disk may be accessed by the mainframe until the first virtual tape is dismounted" (Col. 40, lines 5-11). Because Keele is able to mount/dismount any virtual tape written on optical disks defined within Tape Directory, and because Keele**

explains that optical disks can be written and read sequentially, Keele's invention is able to load/unload a virtual tape that is next in the sequential order in which tapes are written to optical disks. Keele further provides a greater advantage as Keele's invention is able to load any virtual tape written on optical disks by using random search. Refer to (Col. 29, lines 48-60; Col. 36, lines 18-60) wherein Keele teaches having a system of jukeboxes which store optical disks that contain virtual tapes on physical slots and explains that one drive (which contains a currently loaded virtual tape) is unloaded at the same time another drive is being loaded wherein optical disks are written sequentially but can be searched/read in sequential or random order].

As per **claim 24**, Keele discloses, the virtual tape stacker according to claim 23 further comprising:

a physical tape volume, **["MOST can be used alone or in conjunction with 3420 or 3480 tape subsystems" (Col. 19, lines 2-15) which comprise cartridge tape drives which correspond to physical tape devices]**

wherein a last one of the virtual tape volumes is previous to the physical tape volume in the sequential access order and a first one of the virtual tape volumes is next from the physical tape volume in the sequential access order **[With respect to this limitation, Keele discloses "MOST can be used alone or in conjunction with 3420 or 3480 tape subsystems" (Col. 19, lines 2-15) which comprise tape cartridge tape drives having loadable tapes and explains "the moving existing data from magnetic tape to optical disks… conversion to the optical media requires that data be transferred from magnetic tape. This can be accomplished by copying existing**

data from tape to optical storage" (Col. 19, lines 2-29) wherein "each optical disk contains one or more virtual tapes" (Col. 40, lines 5-6) and explains "the optical disk 20 is made up of one-thousand-and-twenty-four byte sectors. These sectors can be written and read sequentially from the start of the optical disk through to the end" (Col. 40, lines 64-67)]. For example, when using optical storage in place of tapes, MOST writes virtual tapes to optical disks sequentially, when writing/copying a virtual tape from a magnetic tape which corresponds to a (physical tape volume) as claimed by Applicant, this (physical tape volume) is written after the virtual tape volume sequentially in optical disks and when continuing to use optical storage in place of tapes, MOST writes virtual tapes to optical disks sequentially after writing (physical tape volume). Therefore, Keele implicitly discloses wherein a last one of the virtual tape volumes is previous to the physical tape volume in the sequential access order and a first one of the virtual tape volumes is next from the physical tape volume in the sequential access order. **[Applicant should note that because Keele is able to mount/dismount any virtual tape written on optical disks defined within Tape Directory (not just a virtual tape sequentially written after a currently loaded virtual tape), and because Keele explains that optical disks are written sequentially and can be accessed sequentially or randomly, Keele's invention is able to load/unload a virtual tape that is next in the sequential order in which virtual tapes are written to optical disks. Keele further provides a greater advantage as Keele's invention is able to load any virtual tape written on optical disks by using random allocation within optical disks. Refer to (Col. 29, lines 48-60; Col. 36, lines 18-60) wherein Keele teaches having a system of jukeboxes which store optical disks that contain virtual tapes on physical slots and explains that one drive (which contains a currently loaded virtual tape) is**

unloaded at the same time another drive is being loaded wherein optical disks are written sequentially but can be searched/read in sequential or random order].

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Keele et al. (US 5,455,926) in view of Dailey et al. (US 2004/0098244).

As per **claim 24**, Keele discloses, the virtual tape stacker according to claim 23 further comprising:

a physical tape volume, **["MOST can be used alone or in conjunction with 3420 or 3480 tape subsystems" (Col. 19, lines 2-15) which comprise cartridge tape drives which correspond to physical tape devices]**

wherein a last one of the virtual tape volumes is previous to the physical tape volume in the sequential access order and a first one of the virtual tape volumes is next from the physical tape volume in the sequential access order **[With respect to this limitation, Keele discloses "MOST can be used alone or in conjunction with 3420 or 3480 tape subsystems" (Col. 19, lines 2-15) which comprise tape cartridge tape drives having loadable tapes and explains "the moving**

existing data from magnetic tape to optical disks… conversion to the optical media requires that data be transferred from magnetic tape. This can be accomplished by copying existing data from tape to optical storage" (Col. 19, lines 2-29) wherein "each optical disk contains one or more virtual tapes" (Col. 40, lines 5-6) and explains "the optical disk 20 is made up of one-thousand-and-twenty-four byte sectors. These sectors can be written and read sequentially from the start of the optical disk through to the end" (Col. 40, lines 64-67)]. For example, when using optical storage in place of tapes, MOST writes virtual tapes to optical disks sequentially, when writing/copying a virtual tape from a magnetic tape which corresponds to a (physical tape volume) as claimed by Applicant, this (physical tape volume) is written after the virtual tape volume sequentially in optical disks and when continuing to use optical storage in place of tapes, MOST writes virtual tapes to optical disks sequentially after writing (physical tape volume). Therefore, Keele implicitly discloses wherein a last one of the virtual tape volumes is previous to the physical tape volume in the sequential access order and a first one of the virtual tape volumes is next from the physical tape volume in the sequential access order. **[Applicant should note that because Keele is able to mount/dismount any virtual tape written on optical disks defined within Tape Directory (not just a virtual tape sequentially written after a currently loaded virtual tape), and because Keele explains that optical disks are written sequentially and can be accessed sequentially or randomly, Keele's invention is able to load/unload a virtual tape that is next in the sequential order in which virtual tapes are written to optical disks. Keele further provides a greater advantage as Keele's invention is able to load any virtual tape written on optical disks by using random allocation within optical disks. Refer to (Col. 29, lines 48-60; Col. 36, lines 18-60) wherein Keele teaches**

having a system of jukeboxes which store optical disks that contain virtual tapes on physical slots and explains that one drive (which contains a currently loaded virtual tape) is unloaded at the same time another drive is being loaded wherein optical disks are written sequentially but can be searched/read in sequential or random order].

To further detail Keele's disclosure, Dailey discloses incorporating physical tape volumes within virtual tape volumes **[Dailey discloses this concept as "library control unit 76 generates control signals to direct a robot arm 10 to retrieve the appropriate data tape cartridge from cartridge storage 82 and insert the data tape cartridge into one of drives 84" (Pages 6-7, paragraph 0080 and Figure 10) wherein "drives 84 may include one or more conventional tape drives and one or more tape drive emulators for receiving data tape cartridges housing non-tape storage media" (Page 7, paragraph 0084); "cartridges housing different types of media are mechanically indistinguishable by automation unit 78" (Page 7, paragraph 0082) and explains that "tape drive emulator 6 writes the data sequentially within the logical storage areas of non-tape storage medium 5" (Page 3, paragraph 0035). Therefore, the system described by Dailey discloses a tape drive emulator that contains "conventional tape cartridges" (physical volumes) and "non-tape storage media," (logical tape volumes) all stored within the same logical storage areas wherein data pertaining to a "conventional tape cartridge" or physical tape volume is stored within the same virtual space as "virtual tape volumes" that belong to "non-tape storage media," in sequential order]**. Applicant should note that because Dailey clearly discloses **["the tape drive emulator sequentially records the data within the logical storage areas of the non-tape storage medium… maintains a library of tape marks on the storage medium to indicate**

locations within stored data files… the tape drive emulator makes use of the library of tape marks to access the non-tape storage medium in response to tape access commands form a host computing device" [(Abstract). Applicant should note that it is well known in the art that *emulation of magnetic tape devices on non-tape devices comprises creation of virtual/logical tapes;* therefore, disclosing emulation/virtual/logical areas in a non-tape device used to record information/virtual tapes, as claimed by Applicant].

Keele et al. (US 5,455,926) and Dailey et al. (US 2004/0098244) are analogous art because they are from the same field of endeavor of computer memory access and control.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to combine the virtual tape stacker which writes virtual tape drives in sequential order into optical disks as disclosed by Keele with the tape emulation system which incorporates magnetic tape drives with tape drive emulators as taught by Dailey.

The motivation for doing so would have been because Keele teaches **[Keele discloses "MOST can be used alone or in conjunction with 3420 or 3480 tape subsystems" (Col. 19, lines 2-15) which comprise tape cartridge tape drives having loadable tapes and explains "the moving existing data from magnetic tape to optical disks… conversion to the optical media requires that data be transferred from magnetic tape" (Col. 19, lines 2-29)**. Dailey further teaches **["a wide variety of storage media may be used within library automation system" (Page 7, Par. 0086)]**.

Therefore, it would have been obvious to combine Dailey et al. (US 2004/0098244) with Keele et al. (US 5,455,926) for the benefit of creating a virtual tape stacker to obtain the invention as specified in claim 24.

(10) Response to Argument

Claim 16

Appellant argues Keele does not teach that the controller loads/unloads volumes in any specific order, much less a defined sequential order.

In response, this argument has been fully considered but it is not deemed persuasive.

First, Appellant's arguments appear to refer to the terms loading, unloading and accessing as reading operations; however, the terms loading and unloading and accessing are also within the scope of writing operations as when writing operations are performed, data is loaded, unloaded and accessed.

Keele teaches a controller defines a sequential order for loading the virtual tape volumes into the virtual drive as required by claim 16 as **["an optical disk system and method for emulating a set of magnetic tape drives using virtual tape data stored on optical disks" (Col. 17, lines 60-64) wherein MOST controller 14 (Figure 1) wherein "the optical disk 20 is made up of one-thousand-and-twenty-four byte sectors. These sectors can be written and read sequentially (*therefore, as virtual tapes are written on optical disks, they are sequentially loade*) from the start of the optical disk through to the end" (Col. 40, lines 64-67) and explicitly discloses "when writing, the sequential nature of the optical disk 20 provides a good emulation of tape activity. This is because successive records are written sequentially on tape" (Col. 41, lines 2-5) "user records 362 written by the Mainframe 12 to a virtual tape, are stored <u>sequentially</u> on the optical disk 20" (Col. 44, lines 62-64) wherein Keele**

also explicitly illustrates the sequential loading of virtual volume on optical drives as "Tape directory" having virtual tapes stored in sequential order as "virtual tape # 1 (324a), virtual tape #2 (324b)… virtual tape #N (324c)." Keele also discloses (Tape Directory Format Table) which illustrates a "first sector information" having a "first VT" stored within bytes 16-31, and a "second VT" stored within bytes 32-47 (Figure 5 and related text)]. Appellant should note that as virtual tapes are written sequentially on optical disks which are interpreted as a virtual drive, this comprises "a sequential order for loading the virtual tape volumes into the virtual drive" as required by claim 16.

The Examiner would also like to point out that optical disks are written to sequentially, and can be read sequentially or randomly **[(Col. 40, lines 64-Col. 41, line 5)]**; therefore, an embodiment in which these virtual tapes are read in a sequential order from the optical drives is within the scope of Keele's disclosure as optical disks can be read both, sequentially and randomly.

Appellant argues Keele does not disclose a controller that unloads a virtual tape volume and loads a next consecutive one in response to an eject command according to the sequential order as nothing in Keele describes that the VSN requests are made in any particular order or that a VSN is requested for a next consecutive virtual tape in response to an eject command. This remark has been fully considered, but it is not deemed persuasive.

Examiner would like to point out that Keele discloses a controller that unloads a virtual tape volume and loads a next consecutive one in response to an eject command according to the sequential order as [**Keele teaches having a system of jukeboxes which store optical disks**

that contain virtual tapes on physical slots and explains that one drive (which contains a currently loaded virtual tape) is unloaded at the same time another drive is being loaded; further specifying that optical disks are written sequentially but can be searched/read in sequential or random order. Applicant should note that because Keele is able to mount/dismount any virtual tape written on optical disks defined within Tape Directory (not just a virtual tape sequentially written after a currently loaded virtual tape), and because Keele explains that optical disks are written sequentially and can be accessed sequentially or randomly, Keele's invention is able to load/unload a virtual tape that is next in the sequential order in which virtual tapes are written to optical disks. Keele further provides a greater advantage as Keele's invention is able to load any virtual tape written on optical disks by using random allocation within optical disks. Refer to (Col. 29, lines 48-60; Col. 36, lines 18-60) wherein Keele teaches having a system of jukeboxes which store optical disks that contain virtual tapes on physical slots and explains that one drive (which contains a currently loaded virtual tape) is unloaded at the same time another drive is being loaded wherein optical disks are written sequentially but can be searched/read in sequential or random order]. The Examiner would like to point that Keele discloses Appellant's claimed invention and more as Appellant should note that because Keele is able to mount/dismount any virtual tape written on optical disks defined within Tape Directory (not just a virtual tape sequentially written after a currently loaded virtual tape), and because Keele explains that optical disks are written sequentially and can be accessed sequentially or randomly, Keele's invention is able to load/unload a virtual tape that is next in the sequential order in which virtual tapes are written to optical disks. Keele further provides a greater advantage as Keele's

invention is able to load any virtual tape written on optical disks by using random allocation within optical disks. **[Refer to (Col. 29, lines 48-60; Col. 36, lines 18-60)]** wherein Keele teaches having a system of jukeboxes which store optical disks that contain virtual tapes on physical slots and explains that one drive (which contains a currently loaded virtual tape) is unloaded at the same time another drive is being loaded wherein optical disks are written sequentially but can be searched/read in sequential or random order. The Examiner submits that Keele is capable of loading a next virtual tape in response to an eject command according to a sequential order and also provides further advantages over the claimed invention as Keele is also capable of using the random access nature of optical drives to improve access speed of virtual tapes.

Keele further discloses **["Tape directory" having virtual tapes stored in sequential order as "virtual tape # 1 (324a), virtual tape #2 (324b)… virtual tape #N (324c)." Keele also discloses (Tape Directory Format Table) which illustrates a "first sector information" having a "first VT" stored within bytes 16-31, and a "second VT" stored within bytes 32-47 (Figure 5 and related text) wherein when "one a virtual tape is mounted from those available on a given disk 20, no other virtual tapes on that disk may be accessed by the mainframe until the first virtual tape is dismounted" (Col. 40, lines 5-11)]**; therefore, a virtual tape must be loaded/mounted in order to be written onto an optical drive and it must be unloaded which must be done by an eject command before another virtual tape can be written on the optical drive wherein virtual tapes are written on optical drives sequentially; as evidenced above, they must be loaded/unloaded sequentially.

More specifically, contrary to Appellant's assertion; in Keele, a VSN may be requested for a next consecutive virtual tape in response to an eject command as in Keele, a VSN may be made for any virtual tape, including a next consecutive virtual tape. Refer to **[(Col. 39, lines 9-24) wherein it is disclosed that when a VSN request, Keele's MOST controller loads the optical disk containing the requested VSN if it is not currently loaded and refers to disk directory which stores a sequence of virtual tapes (Refer to Figure 5) in order to mount the requested VSN]**. Nothing in Keele prevents loading a sequentially next virtual tape to the currently mounted virtual tape, since Keele is not only capable of loading a sequentially next virtual tape to the currently mounted virtual tape, but is also capable of loading any virtual tape.

Claim 17

Appellant argues Keele does not disclose "a volume management table residing on the random access data storage device and accessible by the controller, the volume management table having pointers to the virtual tape volumes; and a virtual tape manager residing on the controller that accesses the pointers so as to determine the next consecutive one of the virtual tape volumes" as in Keele, "the tape map pointers are note used to determine the next consecutive virtual tape volume. Rather, Keele teaches that software or an operation determine which virtual tape to load through the VSN (volume and serial number)."

In response, this argument has been fully considered but it is not deemed persuasive.

Keele discloses "a virtual tape manager residing on the controller that accesses the pointers so as to determine the next consecutive one of the virtual tape volumes" as **["Most maintains a system of pointers one each side of an optical disk pointing to user records for**

each virtual tape recorded on that side" (Col. 40, lines 31-33) wherein "Keeping the system of pointers in local memory reduces accesses to the disk, and speeds sequential tape operations" (Col. 40, lines 46-48) and a tape directory stores pointers to tape maps wherein "the tape map, stored for each virtual tape on the optical disk, is used to keep track of where on the disks 20 each record is stored." (Column 41, lines 22-25) wherein Keele also illustrates "Tape directory" having virtual tapes stored in sequential order as "virtual tape # 1 (324a), virtual tape #2 (324b)... virtual tape #N (324c)." Keele also discloses (Tape Directory Format Table) which illustrates a "first sector information" having a "first VT" stored within bytes 16-31, and a "second VT" stored within bytes 32-47 (Figure 5 and related text)]; therefore, as Keele discloses sequentially loading tape directory having pointers to tape maps, Keele discloses accessing pointers to determine the next consecutive one of the virtual tape volumes. Appellant should note that Keele's tape directory is used to access any virtual tape; refer to **[(Col. 39, lines 9-24) wherein it is disclosed that when a VSN request, Keele's MOST controller loads the optical disk containing the requested VSN if it is not currently loaded and refers to disk directory which stores a sequence of virtual tapes (Refer to Figure 5) in order to mount the requested VSN]**; therefore, any virtual tape is loaded by referring to tape directory (which stores a sequence of virtual tapes), including a next consecutive virtual tape.

Claim 18

Appellant argues that Keele does not disclose that the physical tape volume becomes part of the virtual tape volume storage rotation. This argument has been fully considered, but it is not

deemed persuasive as Keele discloses **[Keele discloses "MOST can be used alone or in conjunction with 3420 or 3480 tape subsystems" (Col. 19, lines 2-15) which comprise tape cartridge tape drives having loadable tapes and explains "the moving existing data from magnetic tape to optical disks... conversion to the optical media requires that data be transferred from magnetic tape. This can be accomplished by copying existing data from tape to optical storage" (Col. 19, lines 2-29) (*thereby loading physical tape volumes on optical drive*) wherein "each optical disk contains one or more virtual tapes" (Col. 40, lines 5-6) and explains "the optical disk 20 is made up of one-thousand-and-twenty-four byte sectors. These sectors can be written and read sequentially from the start of the optical disk through to the end" (Col. 40, lines 64-67)]** wherein Appellant should note that since virtual tapes are written sequentially on optical drive, when a physical tape is written on the optical drive, it is incorporated/loaded into the optical drive's sequential storage rotation.

Further, Appellant's arguments appear to refer to the term loading as a reading operation; however, the term is also within the scope of writing operations as when writing operations are performed, data is loaded on the device on which it is written.

Claim 19

Appellant argues Keele does not disclose a predetermined access order for the tape map pointers that define the sequential order for loading virtual tape volumes into the virtual tape drive.

In response, this argument has been fully considered but it is not deemed persuasive.

Keele discloses a predetermined access order for the tape map pointers that defines the sequential order for loading virtual tape volumes into the virtual tape drive as [**"Most maintains a system of pointers one each side of an optical disk pointing to user records for each virtual tape recorded on that side" (Col. 40, lines 31-33) wherein "Keeping the system of pointers in local memory reduces accesses to the disk, and speeds sequential tape operations" (Col. 40, lines 46-48) wherein Keele also illustrates "Tape directory" having virtual tapes stored in sequential order as "virtual tape # 1 (324a), virtual tape #2 (324b)… virtual tape #N (324c)." Keele also discloses (Tape Directory Format Table) which illustrates a "first sector information" having a "first VT" stored within bytes 16-31, and a "second VT" stored within bytes 32-47 (Figure 5 and related text)]**; therefore, as Keele discloses sequentially writing tape directory having pointers to tape maps, Keele discloses accessing/loading pointers that define the sequential order for loading/writing virtual tape volumes into the virtual tape drive.

Claim 20

Appellant argues Keele does not disclose that the tape map pointers are read according to a predetermined access order.

In response, this argument has been fully considered but is it not deemed persuasive.

Keele discloses reading pointer according to a predetermined access order as [**Keele discloses that the MOST controller uses the system of pointers to "seek addresses on the optical disk" (Column 40, lines 45-46) and further explains that tape directory stores pointers to tape maps wherein "the tape map, stored for each virtual tape on the optical**

disk, is used to keep track of where on the disks 20 each record is stored." (Column 41, lines 22-25) (Figures 1 and 5 and related text). Keele also discloses virtual tapes/data are written/read to optical disks sequentially (Col. 20, lines 32-41 and Col. 40, lines 64). Therefore, MOST controller accesses/reads tape directory having pointers to tapes maps to determine the next sequentially consecutive virtual tape volume or the location of any tape volume within optical disk since optical disks are written sequentially and can be read/accessed sequentially or randomly.

Claim 21

Appellant's arguments with respect to claim 21 parallel those presented with respect to claims 19 and 18 above. Accordingly, these arguments are addressed at least in the manner that claims 19 and 18 have been addressed above.

Claim 22

Appellant's arguments with respect to claim 22 parallel those presented with respect to claim 16 above. Accordingly, these arguments are addressed at least in the manner that claim 16 has been addressed above.

Claim 23

Appellant's arguments with respect to claim 23 parallel those presented with respect to claim 17 above. Accordingly, these arguments are addressed at least in the manner that claim 17 has been addressed above.

Claim 24

Appellant argues the combination of Keele and Dailey does not disclose that the last virtual tape volume is previous to a physical tape volume in an access order and a first virtual tape volume is next form the physical tape volume in access order; however, Examiner disagrees.

The combination of Keele and Dailey discloses last virtual tape volume is previous to a physical tape volume in an access order and a first virtual tape volume is next form the physical tape volume in access order as Keele discloses [**"MOST can be used alone or in conjunction with 3420 or 3480 tape subsystems" (Col. 19, lines 2-15) which comprise tape cartridge tape drives having loadable tapes and explains "the moving existing data from magnetic tape to optical disks… conversion to the optical media requires that data be transferred from magnetic tape. This can be accomplished by copying existing data from tape to optical storage" (Col. 19, lines 2-29) (*thereby loading physical tape volumes on optical drive*) wherein "each optical disk contains one or more virtual tapes" (Col. 40, lines 5-6) and explains "the optical disk 20 is made up of one-thousand-and-twenty-four byte sectors. These sectors can be written and read sequentially from the start of the optical disk through to the end" (Col. 40, lines 64-67)]** wherein Appellant should note that since virtual tapes are written sequentially on optical drive, when a physical tape is written on the optical drive, it is incorporated/loaded into the optical drive's. This physical tape volume is written after a virtual tape volume sequentially in optical disks and when continuing to use optical storage in place of tapes, MOST writes virtual tapes to optical disks sequentially after writing physical tape volume. Therefore,

Keele implicitly discloses wherein a last one of the virtual tape volumes is previous to the physical tape volume in the sequential access order and a first one of the virtual tape volumes is next from the physical tape volume in the sequential access order. Dailey further discloses **["library control unit 76 generates control signals to direct a robot arm 10 to retrieve the appropriate data tape cartridge from cartridge storage 82 and insert the data tape cartridge into one of drives 84" (Pages 6-7, paragraph 0080 and Figure 10) wherein "drives 84 may include one or more conventional tape drives and one or more tape drive emulators for receiving data tape cartridges housing non-tape storage media" (Page 7, paragraph 0084); "cartridges housing different types of media are mechanically indistinguishable by automation unit 78" (Page 7, paragraph 0082) and explains that "tape drive emulator 6 writes the data sequentially within the logical storage areas of non-tape storage medium 5" (Page 3, paragraph 0035)]**. Therefore, the system described by Dailey discloses a tape drive emulator that contains "conventional tape cartridges" (physical volumes) and "non-tape storage media," (logical tape volumes) all stored within the same logical storage areas wherein data pertaining to a "conventional tape cartridge" or physical tape volume is stored within the same virtual space as "virtual tape volumes" that belong to "non-tape storage media," in sequential order. Appellant should note that because Dailey clearly discloses **["the tape drive emulator sequentially records the data within the logical storage areas of the non-tape storage medium... maintains a library of tape marks on the storage medium to indicate locations within stored data files... the tape drive emulator makes use of the library of tape marks to access the non-tape storage medium in response to tape access commands form a host computing device" (Abstract)].** Appellant should note that it is well known in the art that

emulation of magnetic tape devices on non-tape devices comprises creation of virtual/logical tapes; therefore, disclosing emulation/virtual/logical areas in a non-tape device used to record information/virtual tapes, such that a last virtual tape volume is previous to a physical tape volume in an access order and a first virtual tape volume is next form the physical tape volume in access order as claimed by Appellant.

In response to Appellant's remarks that the Examiner has not given Appellant a fair opportunity to dispute the combination of Keele and Dailey in the rejection to claim 24 during prosecution; the Examiner respectfully disagrees and submits that Appellant has been given the opportunity to dispute the combination of Keele and Dailey since claim 24 has been clearly rejected under 35 U.S.C. 103 obviousness type rejection as of Final Office action mailed on January 31, 2007.

Appellant further argues that Dailey does not further detail Keele's disclosure; however, Appellant should note that claim 24 has been rejected under 35 U.S.C. 103 and it is the Examiner's position that the combination of Keele and Dailey discloses all the limitations required by claim 24 wherein the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, both Keele and Dailey are directed and involved in

virtual tape systems wherein at the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the virtual tape stacker which writes virtual tape drives in sequential order into optical disks as disclosed by Keele with the tape emulation system which incorporates magnetic tape drives with tape drive emulators as taught by Dailey since Keele discloses **["MOST can be used alone or in conjunction with 3420 or 3480 tape subsystems" (Col. 19, lines 2-15) which comprise tape cartridge tape drives having loadable tapes and explains "the moving existing data from magnetic tape to optical disks... conversion to the optical media requires that data be transferred from magnetic tape" (Col. 19, lines 2-29)]** and Dailey further teaches **["a wide variety of storage media may be used within library automation system" (Page 7, Par. 0086)]**.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Yaima Campos/

Examiner, Art Unit 2185

Conferees:

/Sanjiv Shah/

Supervisory Patent Examiner, Art Unit 2185

Sanjiv Shah

Supervisory Patent Examiner

/Manorama Padmanabhan/

Mano Padmanabhan

Quality Assurance Specialist, TC 2100, WG2180